Headache evaluation and management after concussion
OVERVIEW

• Introduction
  – Definition
• Acute post-traumatic headache
  – Red flags
• Persistent post-traumatic headache
  – Recognizing headache types
  – Treatment options
INTRODUCTION

• Headache is one of the most common and persistent symptom following traumatic brain injury.

• An estimated 2.5 million reported TBIs per year in the USA alone (Lucas. Curr Pain Headache Rep 2015)

• 75% of TBI are considered mild (Lucas et al. Cephalgia 2014)
Prevalence at 1 year?

- Prevalence remains high at over 44% throughout the year after moderate or severe TBI and over 54% after mild TBI (Lucas et al, Curr Pain Headache Rep, 2015).
DEFINITION

- The diagnostic criteria of ICHD-3 beta for all subtypes require that headache must be reported to have developed within 7 days of trauma or injury.
- or within 7 days after regaining consciousness and/or the ability to sense and report pain when these have been lost following trauma or injury.

*The International Classification of Headache Disorders, 3rd edition (beta version), 2013*
Post traumatic headache attributed to moderate to severe injury to the head

Injury to the head associated with at least one of the following:
1. loss of consciousness for >30 minutes
2. Glasgow Coma Scale (GCS) score <13
3. post-traumatic amnesia\(^1\) lasting >24 hours
4. alteration in level of awareness for >24 hours
5. imaging evidence of a traumatic head injury such as intracranial haemorrhage and/or brain contusion.

The International Classification of Headache Disorders, 3rd edition (beta version), 2013
Post traumatic headache attributed to mild injury to the head

Injury to the head fulfilling both of the following:
1. associated with none of the following:
   a) loss of consciousness for >30 minutes
   b) Glasgow Coma Scale (GCS) score <13
   c) post-traumatic amnesia lasting >24 hours
   d) altered level of awareness for >24 hours
   e) imaging evidence of a traumatic head injury such as intracranial haemorrhage and/or brain contusion

2. associated, immediately following the head injury, with one or more of the following symptoms and/or signs:
   a) transient confusion, disorientation or impaired consciousness
   b) loss of memory for events immediately before or after the head injury
   c) two or more other symptoms suggestive of mild traumatic brain injury: nausea, vomiting, visual disturbances, dizziness and/or vertigo, impaired memory and/or concentration.

*The International Classification of Headache Disorders, 3rd edition (beta version), 2013*
DEFINITION

• During the first 3 months from onset they are considered acute.
• If they continue beyond that period they are designated persistent.
Acute post-traumatic headache

- Immediately following a head injury
- Want to identify the injury severity and other associated injuries
- The sideline or acute medical evaluation should include a systematic examination
  - including how the trauma occurred
  - symptoms following it
  - presence of amnesia, memory problems or loss of consciousness, balance problems, and/or overall behavior change from baseline
If there are headaches

• History of headache prior to trauma
• Family history of headache
• Neuroimaging?
  – Concern for skull or spine fracture
  – if red flags are present
RED FLAGS

• Concern for **intracranial process**
  – abnormalities or asymmetries on neurologic examination
  – altered mental status
  – worsening headache with Valsalva maneuver
  – underlying risk factors such as hypercoagulable state (genetic or acquired, pregnancy, cancer) and anticoagulation therapy
CASE 1

- 28 yo woman presented to the ED with 5 day gradual persistent headache and scalp tenderness after a whiplash injury.
- She was rear ended at a stop sign.
- There was no LOC and she denies any balance difficulty, memory problem or overall behavior changes.
CASE 1

- On examination she was normotensive and her temperature was also normal.
- There was no meningeal signs
- She had no neurological deficit
- CTH was unremarkable
- She was reassured and sent home
CASE 1

- The next morning, she noted difficulty in eating.
- She was able to swallow but found it difficult to move her tongue.
- She had no hoarseness.
- On examination her speech was dysarthric, and she had leftward deviation on tongue protrusion.
- Taste and tongue sensation were normal.
TONGUE WEAKNESS
CN12 (HYPOGLOSSAL NERVE)
ARTERIAL DISSECTION

MRA showed reduction in caliber of L ICA (A)
And pseudoaneurysm (B)
CASE 1

• She was started on ASA
• Repeat imaging were done at 6 weeks, slight improvement in L ICA was shown.
• At 3 months in f/u clinic visit, her speech had improved with only occasional dysarthria.
• She no longer reported headaches.
CASE 2

• 19 yo woman presented with 3 days of mild but constant headache after being hit by soccer ball while playing with her cousin.

• She complained of difficulty focusing and double vision.
CASE 2

• Her past medical history is significant for knee surgery 2 months ago, had developed a DVT and was started on anticoagulation 4 weeks ago.

• On exam, vital signs are normal. BMI >25
CASE 2

- Pupils were asymmetric
- Difficulty with adducting R eye
- ➔ CN 3 palsy
Normal MRI

T1- weighted MRI: hyperintense sellar mass
PITUITARY APOPLEXY

• It’s characterized by acute infarction and/or hemorrhage of the pituitary gland.
• Present with:
  – Headache
  – visual impairment
  – cranial nerve palsies
  – impairment of consciousness
  – pituitary hormone deficiencies.
• In most cases, apoplexy involves a previously unrecognized pituitary adenoma.
Four categories of triggering factors

- **Vascular flux reduction**: surgery, specially cardiac surgery, radiotherapy, post spinal anesthesia.
- **Acute increase in blood flow**: pregnancy, systemic hypertension.
- **Pituitary stimulation**: provocative pituitary tests, specially TRH, GnRH analogues use.
- **Coagulation disturbances**: thrombocytopenia, anticoagulation.
Take home message..

Acute post traumatic headache with subtle neurological findings should be investigated.
PERSISTENT POST TRAUMATIC HEADACHE

- After 4-11 years, 500 veterans with TBI (Couch et al., Headache, 2016)
- TBI - 89% had migraine, 2% probable migraine, 9% had tension, and 0% had no headaches.
- Control - 36% had migraine, 15% probable migraine, 27% tension, and 22% no headache (P < .0001).
- Migraine with aura occurred in 38% of TBI and 6% of control (P < .0001).
- There was no correlation of severity of headache problem with severity of TBI.
PERSISTENT POST TRAUMATIC HEADACHE

• The most common headache type after mTBI are migraine headache and tension-type headache.
• No randomized clinical trials of medication for post-traumatic headache in either children or adults.
• Management should be tailored to the type of headache.
CASE 3

- 20 yo man with pmh significant for ADHD, anxiety presented with daily headaches for 6 months.
- His headaches started after a second snowboard accident.
- Both events were separated by a few weeks.
- No LOC, hit his head, felt “foggy” afterward.
- Now he still reports difficulty concentrating (attending college, has a W on econ class)
CASE 3

- His headaches are located in his temples, top of head and back of the head.
- Intensity varies between 2-4/10.
- No nausea, light, sound or smell sensitivity
- Physical activity does not aggravate his headaches.
CASE 3

- Neurological exam is normal
- MRI brain done previously was unremarkable
- He is here with his mom who is very anxious
CASE 3

• Diagnosis?
A. Migraine headache
B. Tension-type headache
C. Non-classified headache type
D. He doesn’t have headaches
TENSION TYPE HEADACHE

• Definition:
  – Bilateral location
  – Pressing or tightening (non-pulsating) quality
  – **Mild** intensity
  – Not aggravated by routine physical activity such as walking or climbing stairs
  – No nausea or vomiting
  – No more than one of photophobia or phonophobia
DEFINITION MIGRAINE HEADACHE

- Unilateral location
- Pulsating quality
- Moderate or severe pain intensity
- Aggravation by or causing avoidance of routine physical activity (e.g., walking or climbing stairs)
- Nausea, vomiting, or both
- Photophobia and phonophobia
- Last >4 hours
CASE 3

• Diagnosis?

A. Migraine headache

★ Tension-type headache

C. Non-classified headache

D. He doesn’t have headaches
TREATMENT

• TCA
  – Amitriptyline (10-75 mg qhs)
  – Nortriptyline (10-75 mg qhs)
  – Protriptyline (5-20 mg qam)-activating, weight loss
• SNRI- Venlafaxine (37.5-150 mg qam)
• Muscle relaxant-daily-not proven effective
• Botulinum toxin injection-not proven effective
• Trigger point injection-effective
CASE 3

- Patient did well on 20 mg of Nortriptyline
- He reported 1-2 headaches per week
- Ibuprofen 400 mg sufficient to abort his headaches.
- After 6 months of good control, he didn’t want to stop Nortriptyline.
CASE 4

• 18 yo woman with past medical history of migraine headache since age 9, who presented with daily headache for 2 years.
• She used to play basketball and had a “handful” of concussions, none with LOC.
• She had only 1 event associated with LOC, at age 16 she fell off her horse. She felt confused for 15 minutes.
• Her headaches worsen a few weeks afterwards.
CASE 4

• Her headaches are located behind the right eye, in the forehead, temple and in the back of the head.
• The quality of the pain can be throbbing, pressure-like or stabbing.
• The intensity of the pain varies between 7-10/10.
• Her headaches are associated with nausea, sensitivity to light, sound, smell, touch, dizziness, fatigue and difficulty concentrating.
TRIED MEDICATION/INTERVENTION IN THE PAST

1. Topamax
2. Verapamil
3. Amitriptyline
4. Nortriptyline
5. Lamictal
6. Botox
7. Maxalt
8. Imitrex
9. Zomig NS
10. Toradol IM/IV-helpful
11. Occipital nerve-not effective
CASE 4

• Currently she is no preventative since “nothing ever works for me”

• She only uses Advil or Excedrin to break her headaches.
CASE 4

• Diagnosis?
A. Migraine headache
B. Tension-type headache
C. Non-classified headache type
D. She doesn’t have headaches
CASE 4

- Diagnosis?
  A. Migraine headache
  B. Tension-type headache
  C. Non-classified headache type
  D. She doesn’t have headaches
With prompting...

• She admits using **2-3 tablets** of either Advil or Excedrin daily.

• Does that change her diagnosis?
No

- #1 Migraine Headache
- #2 Medication overuse headache
MOH Criteria

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<thead>
<tr>
<th>Table.—The International Classification of Headache Disorders (ICHD)-3β Criteria for Medication Overuse Headache</th>
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<tbody>
<tr>
<td>A. Headache present on 15 or more days/month in a patient with a pre-existing headache disorder</td>
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<td>B. Regular overuse for more than 3 months of 1 or more drugs that can be taken for acute and/or symptomatic treatment of headache</td>
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<td>1. Ergotamine, triptans, opioids or combination analgesics on 10 or more days/month</td>
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<td>2. Simple analgesics on 15 or more days/month</td>
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<td>3. Any combination of acute/symptomatic drugs on 10 or more days/month without overuse of any single class alone</td>
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<td>C. Not better accounted for by any other ICHD-3 diagnosis</td>
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The International Classification of Headache Disorders, 3rd edition (beta version)
Which drugs?

• Bigal et al. (2008, Headache) found that barbiturates (butalbital combinations) can cause MOH if used only 5 or more days per month.

• Opioids if taken 8 days or more per month

• Triptans if taken 10 or more days per month.

• Non-steroidal anti-inflammatory drugs (NSAIDs), if if taken 10 or more days per month.
CASE 4

• Stop daily Advil/Excedrin
• Bridging therapy (protocol) x 6 weeks
  – long acting NSAIDs (Naproxen 500 mg bid) + muscle relaxant (Tizanidine 2-16mg qhs) *Smith.* *Headache* 2002
• Start Venlafaxine 37.5 mg x 2 weeks, then increased to 75 mg qam.
• Retrial of Rizatriptan (10 mg) to break her headaches
At 2 months visit

- She “felt like a new person”
- She reports now only 2-4 headaches per month responsive to Rizatriptan (which did not work in the past).
- **Rizatriptan** (10 mg, max 30 mg/24 hrs) was chosen as with **Eletriptan** (40 mg, max 80 mg/24 hrs), they are **most potent triptans**.
When to consider Preventive Treatment?

- Use acute medications **more than 10 days** per month
- No longer responsive to rescue medication
- Side effects from acute treatment
- Affect patient daily life-home, work, or school
TREATMENT OPTIONS

• Beta blocker:
  – **Propranolol** 40-240 mg daily or bid if short acting, 1-2 mg/kg in children
  – **Metoprolol** 50-200 mg daily
  – **Nadolol** 20-120 mg daily, fewer side effects than propranolol
  – **Atenolol** 25-150 mg daily- fewer side effects than propranolol, **more suitable for pts with chronic lung disease/asthma at lower dose**
Antiepileptic drugs

- Level A evidence (established efficacy)
- **Topiramate**: 25-125 mg qhs (not effective above 200 mg/day)
- **Valproate/divalproex**: 500-2000 mg daily
TREATMENT

• **Antidepressant** level B evidence (probably effective)
  – Amitriptyline (10 mg - 75 mg qhs)
  – Venlafaxine (37.5 mg- 150 mg qam)

• **Level C evidence** (possibly effective)
  – Lisinopril 10-40 mg daily
  – Candesartan 16-32 mg daily
  – Cyproheptadine (12 -32 mg bid or qhs)-children/pregnant patient

• **Level U** (inadequate or conflicting data):
  – Acetazolamide, Fluoxetine, Gabapentin, Verapamil
Complementary Alternative therapy

- Physical activity (40 min x 3 w)
- Acupuncture
- Nutraceuticals
  - Magnesium citrate 400 mg daily
  - Riboflavin 400 mg daily or 200 mg twice a day
  - Coenzyme Q10 300-600 mg qam
- Biobehavioral treatment
  - CBT
  - Thermal biofeedback with relaxation
  - Relaxation training
Post traumatic headaches are very common and persistent

Treated like a primary headache disorder

Mild headache, not aggravated by movement $\rightarrow$ tension-type headache

Moderate to severe headache, pt wants to be still $\rightarrow$ migraine headache

Headaches with any neurological symptoms $\rightarrow$ Neuroimaging/ED
Thank You